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(71) Applicant(s)
Sword (Aberdeen) Limited

(Incorporated in the United Kingdom)

Unit 5, Crombie Road, ABERDEEN, United Kingdom

(72) Inventor(s)
John Joseph Haisley

(74) Agent and/or Address for Service
Boult Wade Tennant
27 Furnival Street, LONDON, EC4A 1PQ,
United Kingdom

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A5A A14G
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GB 0217118 A **US 4358058 A**

(58) Field of Search
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INT CL^6 **A62C 31/05 35/60 , B05B 1/06 1/14 1/26**
Online database [WPI]

(54) **Nozzle for pressurized water**

(57) A pressurized water nozzle has an inlet 20 for connection to a pressurized water supply and a first, annular water discharge opening 44 for producing a hollow cone of water 64. A second water discharge opening 60 is partially blocked by diffuser 14, which forces the water through a buttress 62. This divides the flow into smaller, colliding, streams and so produced a cloud of water droplets 66 within the hollow cone 64.

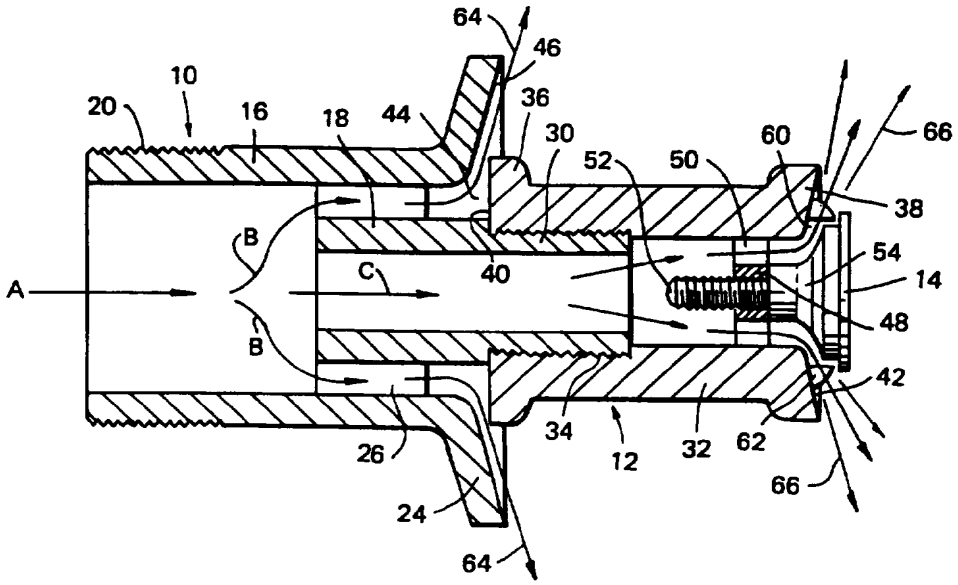

FIG. 2

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

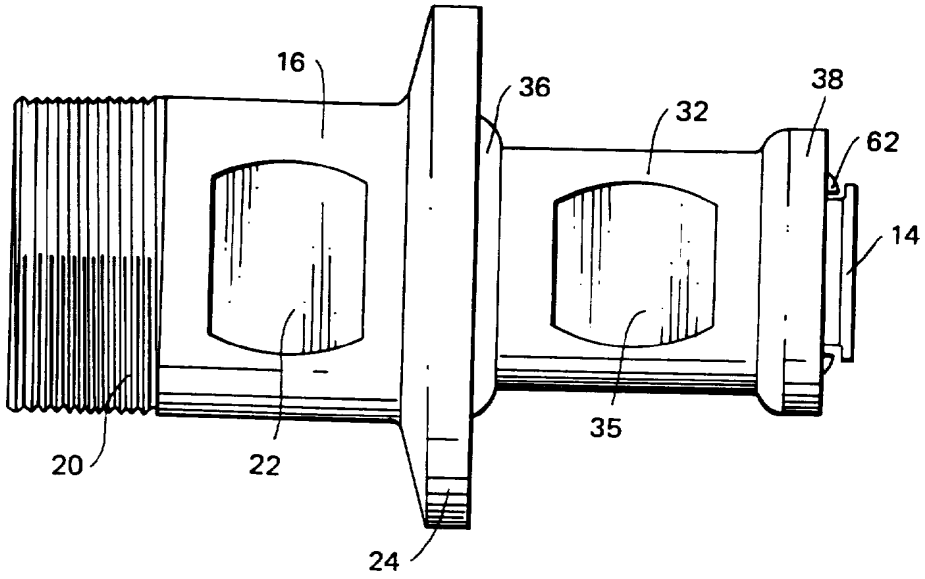
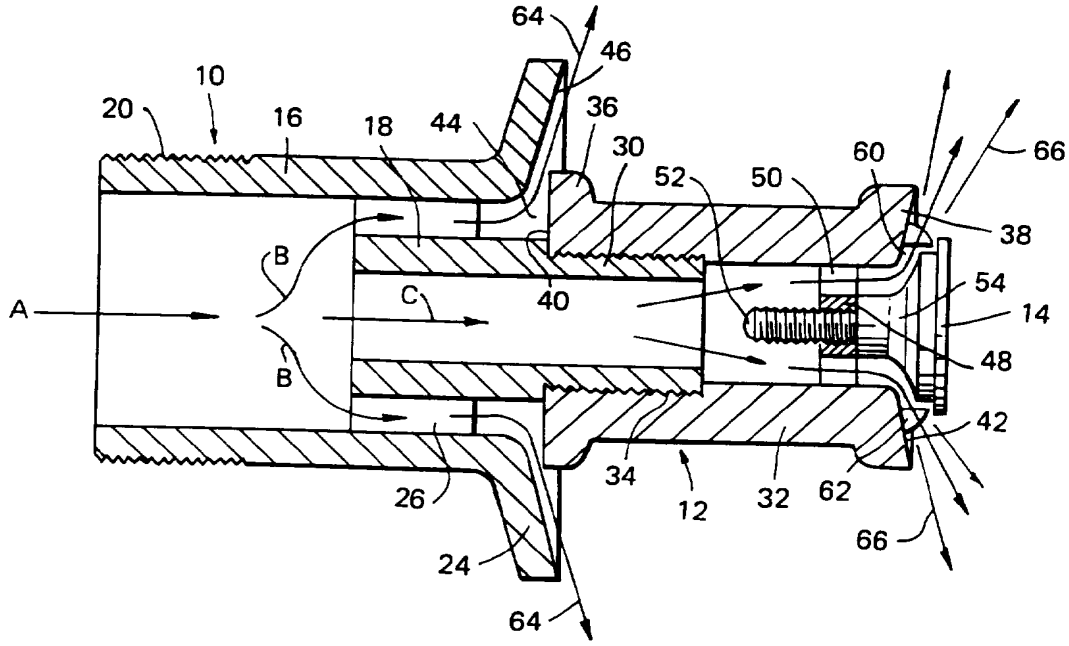

16
36
38
32
62
14
20
22
35
24

FIG. 1


64
46
10
20
16
18
44
36
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60
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38
A
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54
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B
42
26
34
12
32
62
66
24
64

FIG. 2

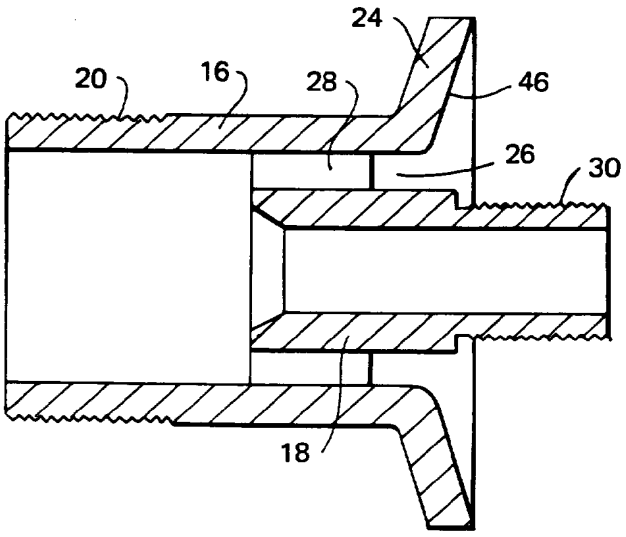

FIG. 3

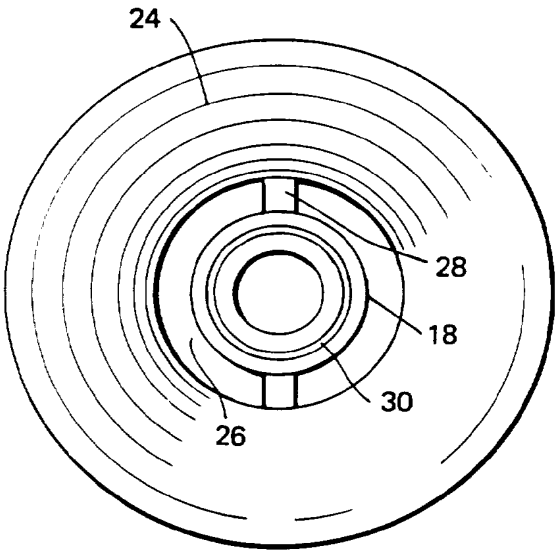

FIG. 3A

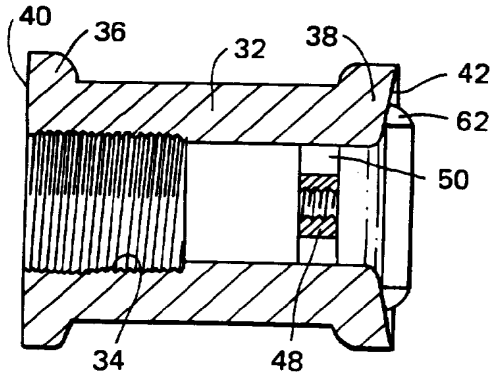

FIG. 4

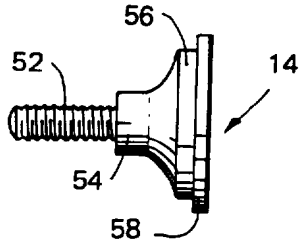

FIG. 6

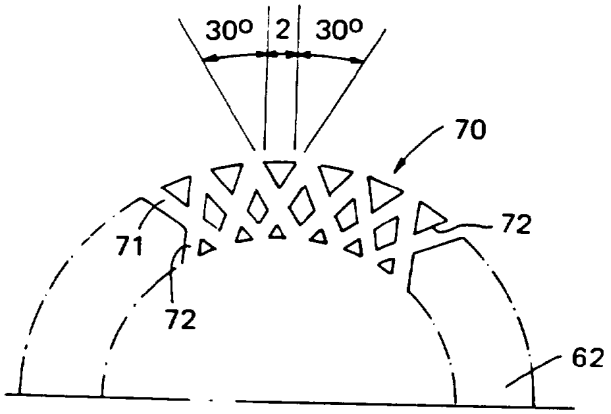

FIG. 5

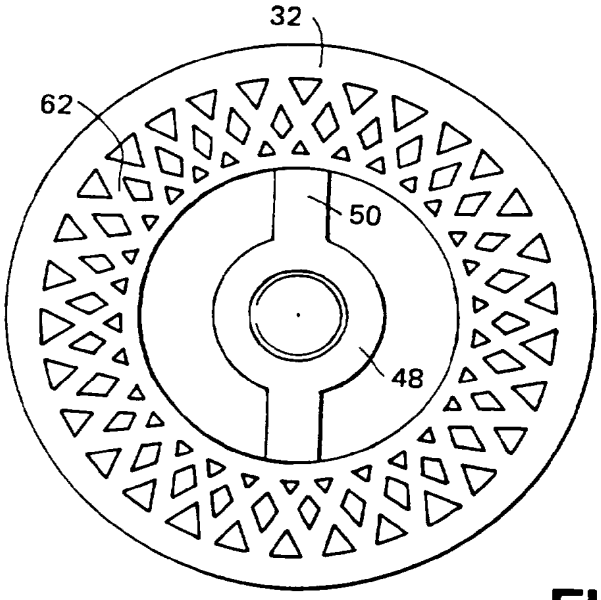

FIG. 4 A

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ESCAPE ROUTE PROTECTION NOZZLE

This invention relates to a pressurized water nozzle, for example for protecting an escape route from heat and smoke in the case of a flammable incident.

Flammable incidents occur on offshore oil and gas platforms and, following recent tragic incidents, regulations now provide that all escape routes should be protected from heat and smoke in the event of such an incident.

Thus it is an object of the present invention to provide a design of nozzle which can provide such protection when a number of such nozzles are disposed in series in pressurized water pipeline(s) along the escape route for discharging water against the areas of flammable incident to provide a substantially continuous wall of water along the escape route.

Accordingly, the present invention provides a pressurized water nozzle having an inlet for connection to a pressurized water supply, a first, annular water discharge opening for producing a hollow cone of water, and a second water discharge opening for producing a cloud of water droplets within the hollow cone.

Geometrical and like expressions used above and in the appended claims are not intended to be interpreted with mathematical precision. For example, "annular" includes any substantially closed figure and is not limited to a circle and, correspondingly, "cone" is not limited to a figure with a circular cross-section.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a side view of an embodiment of nozzle according to the present invention,

Figure 2 is a longitudinal cross-section of the nozzle of figure 1,

Figure 3 is a cross-sectional view of the rear part of the nozzle of figure 1,

Figure 3A is an end view of the rear part looking from the front of the nozzle,

Figure 4 is a cross-sectional view of the front part of the nozzle of figure 1,

Figure 4A is an end view of the front part looking from the front of the nozzle,

Figure 5 shows a detail of figure 4A to an enlarged scale, and

Figure 6 is a side view of the front diffuser member of the nozzle.

The nozzle shown in the embodiment of figures 1 and 2 is a substantially circularly symmetric assembly of three metal parts, a rear part 10 (see also figures 3 and 3A), a front part 12 (see also figures 4 and 4A) and a diffuser member 14 (see also figure 6). In figures 1 and 2 the front of the nozzle is at the right hand side.

The rear part 10 comprises first and second tubular bodies 16 and 18 respectively. The first tubular body 16 has an externally screw-threaded rear portion 20 by which the nozzle may be connected to a pressurized water supply. Opposite flats 22 on the exterior of the body 16 permit engagement by a spanner for this purpose. The first body 16 also has an out-turned, wide-angle, frusto-conical flange 24 at its front end. In this embodiment the flange 24 is at an angle of about 15 degrees to a plane normal to the longitudinal axis of the body 16, so that the frusto-conical angle is 150 degrees.

The second tubular body 18 has its rear portion mounted substantially coaxially within the front portion of the first body 16 so as to define an annular passage 26 between the two. Hence, when the body 16 is connected to a pressurized water supply, water under pressure entering

the body 16 at the rear (arrow A) can pass into and along the annular passage 26 (arrows B). The body 18 is supported by radial supports 28 which are designed to offer as little impedence to the flow of water as possible consistent with the need to hold the body 20 in position. As indicated by the arrow C, water under pressure can also pass through the interior of the tubular body 18. The front portion of the body 18 is externally screw-threaded at 30 where it projects beyond the front of the body 16.

The front part 12 of the nozzle comprises a third tubular body 32 having an internally screw-threaded rear portion 34 which is screw-threadedly mounted upon the front portion 30 of the second body 18 to form a forward tubular extension of the body 18. Opposite flats 35 on the exterior of the body 32 permit engagement by a spanner for this purpose. The body 32 has a shape rather like a bobbin, with out-turned flanges 36, 38 respectively at its rear and front ends. The rear face 40 of the flange 36 lies in a plane substantially normal to the longitudinal axis of the body 32, while the front face 42 of the flange 38 is of frusto-conical form with an angle of about 160 degrees. A narrow annular opening 44 is defined between the rear face 40 of the flange 36 and the front face 46 of the flange 24.

Near its front end the body 32 has an internally screw-threaded collar 48 supported substantially coaxially within the body 32 by radial supports 50 which are designed to offer as little impedence to the flow of water as possible. The diffuser member 14 has an externally screw-threaded stem 52 which is screwed into the collar 48 for supporting the diffuser member 14 substantially coaxially within the front portion of the third body 32. The member 14 has an outwardly flared front portion 54 which, as seen in the figures, is stepped at the extreme front end to provide a narrow substantially cylindrical surface 56 and an annular surface 58 substantially normal to the longitudinal axis of the body 32. A narrow annular opening 60 is defined between the front face 42 of the flange 38 and the surface 58. However, an annular barrier, or buttress, 62 is provided in the annular opening 60, and this will be described in more detail below.

In use, the nozzle is connected to a pressurized water supply, typically 2.5 barG to 7 barG pressure at the nozzle, using the screw-threaded portion 20 of the tubular body 16. Water under pressure enters at A (figure 2) and divides into two flows - the first along the annular passage 26 as indicated by the arrows B, and the second through the hollow interior of the tubular body 18 as indicated by the arrow C.

Water flowing under pressure in the passage 26 emerges at high speed from the narrow annular opening 44 where the pressure energy is converted to kinetic energy to generate a generally symmetrical, wide-angle, hollow cone of water 64. In this embodiment the angle of the cone 64 is about 150 degrees, corresponding to the angle of the flange 24, but it should be at least 90 degrees and preferably more than 120 degrees. Preferably, for use in an escape route protection scheme, the thickness and velocity of the discharging water should be such as to produce sufficient structural strength in the cone 64 to resist distortion by 10 meters/second winds over a 6 to 8 meter diameter centered on the nozzle.

Water flowing under pressure through the hollow interior of the tubular body 18 likewise emerges at high speed from the narrow annular opening 60 where the pressure energy is converted to kinetic energy. However, in this case the water has to pass across the buttress 62 which substantially breaks up the flow of water from the opening 60 to form a dense, approximately homogeneous cloud or water fog 66 of fine water droplets within the cone 64.

The buttress is formed on the front face 42 of the flange 38, and has a cross-section which is a quadrant of a circle so that the height of the buttress, as measured normal to the front face 42, decreases in the direction of water flow through the opening 60. The tip of the buttress 62 substantially touches the diffuser surface 58. The buttress 62 has a large number of channels 70, figures 4A and 5, in this case sixty channels, which are cut down into it from its tip and extend substantially the full depth of the buttress to the face 42.

The channels 70 extend through the buttress in the direction from the

interior to the exterior of the opening 60, and are arranged in two sets of thirty channels 71 and 72 respectively. In each set the channels are inclined at an angle of 30 degrees to the radial direction, but the channels 71 of one set are angled oppositely to the channels 72 of the other set so that pairs of channels, one from each set, intersect within and at the external periphery of the buttress 62 (see figure 5). In use this produces a large number of jets of water around the annular opening 60 which collide at high speed upon discharge from the channels in the buttress to form the cloud 66 of fine water droplets within the cone 64.

In use in a typical escape route protection scheme, the nozzles are mounted side by side 2.3 to 2.6 meters apart in pressurized water pipes providing a water pressure of 2.5 to 7 barG at the nozzles. The nozzles face sideways away from the escape route, i.e. towards the potential hazardous area, so that when they are turned on they produce intersecting cones of water providing a substantially continuous wall of water along the escape route. The water fog spray or cloud 66 within each cone 64 absorbs heat and scrubs toxic gases from the flame and smoke, while the cone 64 itself contains the water fog and prevents smoke particulates from passing through. Hence the environment behind the nozzles, i.e. the escape route, is cooler, relatively gas and smoke free and virtually clear. The nozzles may be disposed in a single line or in a two-dimensional array along one or both sides of the escape route.

The nozzle described above has been designed primarily for use with a number of similar nozzles to provide escape route protection for offshore installations as referred to in the introduction, for which a fairly wide angle cone of water is desirable. However, the nozzle can if desired be used alone or in combination with like nozzles to provide a variety of fire protection or fire suppression devices for onshore or offshore use, and in this connection it may be desirable to change the angle of discharge of water into the cone or other parameters of the nozzle to suit the particular application in which it is used.

CLAIMS

1. A pressurized water nozzle having an inlet for connection to a pressurized water supply, a first, annular water discharge opening for producing a hollow cone of water, and a second water discharge opening for producing a cloud of water droplets within the hollow cone.

2. A nozzle as claimed in claim 1, wherein the second water discharge opening is also an annular opening and has means associated therewith for sufficiently breaking up the flow of water therefrom as to form the said cloud of water droplets.

3. A nozzle as claimed in claim 2, wherein the means for breaking up the flow of water comprises means for producing a large number of colliding jets of water around the second annular opening.

4. A nozzle as claimed in claim 3, wherein the means for breaking up the flow of water comprises a barrier having a large number of channels extending therethrough for producing the said jets of water.

5. A nozzle as claimed in any one of claims 2 to 4, wherein the nozzle comprises a first tubular body having a rear portion adapted for connection to a pressurized water supply, a second tubular body having a rear portion mounted substantially coaxially within the front portion of the first body, a third tubular body mounted upon the front portion of the second body and forming a forward extension thereof, the first annular opening being defined between the front end of the first body and the rear end of the third body, and a diffuser member mounted substantially coaxially within the front portion of the third body and defining therewith the second annular opening.

6. A pressurized water nozzle substantially as herein described with reference to the accompanying drawings.

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Patents Act 1977
Examiner's report to the Comptroller under Section 17
(The Search report)

Application number
GB 9506533.0

Relevant Technical Fields

(i) UK Cl (Ed.N) A5A (A14G, A20X4); B2F (FEC, FFB, FHD)

(ii) Int Cl (Ed.6) A62C 31/05, 35/60; B05B 1/06, 1/14, 1/26)

Search Examiner
J H WARREN

Date of completion of Search
7 JULY 1995

Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE DATABASE; WPI

Documents considered relevant following a search in respect of Claims :-
1-6

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 0217118	(FEENY) page 1 lines 60 to 76, Figure 3	1
A	US 4358058	(BIERMAN) column 2 line 65 - column 3 line 26	

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).